REMARKS

Claims 1, 28, 33, 34 and 38-40, as amended, remain herein. Claim 1 has been amended to exclude ReO_x as a conductive oxide. New claim 40 has been added. Support for the new claim may be found throughout the specification (see, e.g., Table 1 at page 66; and page 11, lines 23-28 of the specification).

1. Claim 1, 28 and 39 were rejected under 35 U.S.C. § 102(e) over Kido et al. U.S. Patent Application Publication 2003/0189401.

Applicants' claim 1 recites an organic electroluminescent device comprising: at least two or more emitting layers between an anode and a cathode, and an intermediate electrode layer being interposed between emitting layers, the intermediate electrode layer being a single layer or a multilayer structure, at least one of the layers comprising a semiconductive material, the semiconductive material comprising at least one conductive oxide comprising a transition metal selected from the group consisting of NbO_x, LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, WO_x, OsO_x, IrO_x and PtO_x, wherein x is 0.2 to 5.

Kido does not disclose applicants' claimed intermediate electrode layer which comprises a semiconductive material and can generate both electrons and holes. Kido's charge generating layer, is an electrically insulating layer and its resistivity is preferably above 10^5 Ω.cm (Kido at ¶ [0026]).

Thus, Kido does not disclose all elements of applicants' claims and therefore, it is not an adequate basis for a rejection under 35 U.S.C. § 102(e). Applicants respectfully request reconsideration and withdrawal of this rejection.

2. Claims 1, 28, 33, 34 and 38 were rejected under 35 U.S.C. § 103(a) over Tanaka et al. U.S. Patent 6,107,734 in view of Mori U.S. Patent 6,215,245 and Tsutsui et al. U.S. Patent Application Publication 2003/0127967.

Applicants' claim 1 recites an organic electroluminescent device comprising: at least two or more emitting layers between an anode and a cathode, and an intermediate electrode layer between emitting layers, the intermediate electrode layer being a single layer or a multilayer structure, at least one of the layers comprising a semiconductive material, the semiconductive material comprising at least one conductive oxide comprising a transition metal selected from the group consisting of NbO_x, LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, WO_x, OsO_x, IrO_x and PtO_x, wherein x is 0.2 to 5.

The present application claims an intermediate electrode layer comprising a semiconductive material comprising at least one conductive oxide comprising a transition metal selected from the group consisting of NbO_x, LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, WO_x, OsO_x, IrO_x and PtO_x, wherein x is 0.2 to 5. Applicants' specification explains that:

> The organic EL device (A) comprises at least two or more emitting layers between an anode and a cathode, and an intermediate electrode layer interposed between emitting layers, the intermediate electrode layer comprising a semiconductive material having a resistivity of 0.001 to 10,000 Ω.cm.
>
> The intermediate electrode layer can generate both electrons and holes since it comprises a semiconductive material with the above resistivity. Thus it can sufficiently supply carriers to either one of the two emitting layers on both the surfaces thereof.
>
> As shown in FIG. 1, an intermediate electrode layer 6 injects holes from a surface A contact with an emitting layer 4 on a cathode 2 side, while it injects electrons from a surface B contact with an emitting layer 8 on a anode 10 side.
>
> The intermediate electrode layer has good contact with the emitting layers and the other organic layers and the organic EL device of the invention can thus have a longer life time than conventional organic EL devices.

> When a material of the intermediate electrode layer has too small a resistivity, current tends to leak. When it has too large a resistivity, voltage increases at the driving time. Preferred then is a semiconductive material having a resistivity of 0.001 to 10,000 Ω.cm, particularly preferably 0.01 to 100 Ω.cm. The intermediate electrode layer preferably has a thickness of 0.1 to 100 nm to function as a thin film. Too thick the thickness thereof may cause an increase in driving voltage.

Applicants' specification, page 11, line 8 to page 12, line 1 (emphasis added here).

The Office Action admits that Tanaka does not disclose applicants' claimed intermediate electrode layer comprising a semiconductive material comprising at least one conductive oxide comprising a transition metal selected from the group consisting of NbO_x, LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, WO_x, OsO_x, IrO_x and PtO_x, wherein x is 0.2 to 5. The Office Action alleges that Tanaka discloses that an electrode material may be used in the intermediate layer and that Mori teaches that IrO_2, MoO_2, NbO, OsO_2, ReO_2, or ReO_3 are suitable compounds for use in a cathode. The Office Action concludes that a person of ordinary skill in the art would be motivated to use the oxides of Mori in the device of Tanaka.

However, a broad range of materials can serve as electrode materials. There is no suggestion in either Tanaka or Mori to use applicants' claimed semiconductive material in the intermediate electrode layer. For instance, Tanaka discloses that a preferred electrode material is ITO (see Tanaka at column 8, lines 9-12). However, ITO does not achieve the same efficiency and lifetime as applicants' claimed organic electroluminescent device. Compare applicants' Example 1 with Comparative Example 1 in Table 1 at page of applicants' specification. Comparative Example 1 is similar to Tanaka and includes an intermediate layer of Alq:Li and ITO (Alq:Li is labeled as an electron injection layer in applicants' specification, but is part of the intermediate layer in Tanaka). Applicants' Example 1 achieves superior efficiency and lifetime compared to Comparative Example 1. Evidence that the claimed invention yields unexpectedly

improved properties, or properties not present in the prior art rebuts an obviousness rejection. See In re Dillon, 919 F.2d 688, 692-93 (Fed. Cir. 1990); MPEP § 2145. Thus, applicants' organic electroluminescent device is not obvious over Tanaka and/or Mori. The Office Action's conclusion of obviousness is based on improper hindsight reasoning.

In addition, a person of ordinary skill in this art would not be motivated to combine Mori and Tanaka. Tanaka discloses an intermediate layer including a layer for injecting holes and a layer for injecting electrons (Tanaka, column 7, lines 42-46). Mori, on the other hand, teaches the use of conductive oxides as stabilizing compounds for low work function sodium or potassium cathodes, i.e., sodium or potassium are essential elements of Mori's cathode. In addition, Mori's oxides may be used "if their conductivity is equivalent to those of pure metals." Mori, column 3, lines 49-50. Thus, Mori discloses conductive materials, not semiconductive materials. A person of ordinary skill in this art would have no motivation to use a conductive cathode material, in combination with sodium or potassium, in a semiconductive layer which has a dual function of supplying electrons and holes. While Mori's conductive oxides may enhance interfacial adhesion and injection efficiency of a cathode, the function of the claimed intermediate electrode is distinct and must supply both electrons and holes.

Furthermore, the results of a claimed combination are not obvious if they are unexpected. MPEP § 2141(V). In this case, Mori suggests using conductive oxides as stabilizing agents for a potassium or sodium cathode, and a person of ordinary in this art could not have expected achieving applicants' superior organic electroluminescent device by using Mori's oxides in a Tanaka intermediate layer.

Nor does Tsutsui teach or suggest what is missing from Tanaka. Tsutsui discloses organic semiconductors. Tsutsui also discloses conductive metallic thin films and metallic oxide

thin films. Tsutsui says nothing about applicants' claimed semiconductive material comprising a conductive oxide comprising a transition metal selected from the group consisting of NbO_x, LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, WO_x, OsO_x, IrO_x and PtO_x.

Claim 40 is further patentable because none of Tanaka, Mori and Tsutsui discloses applicants' claimed intermediate electrode layer having a resistivity between 0.001 and 10,000 Ω.cm. For instance, in Mori, the resistivity of the cathode materials is very low. See Mori, column 3, lines 49-50 ("Stable compounds [] may be used if their conductivity is equivalent to those of pure metals.").

Thus, none of Tanaka, Mori, and Tsutsui discloses or suggests applicants' claimed invention. In addition, there is no disclosure or suggestion in any of Tanaka, Mori, Tsutsui or anything else in this record that would have suggested the desirability of modifying or combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

3. Claim 39 was rejected under 35 U.S.C. § 103(a) over Tanaka in view of Mori and Tsutsui further in view of Liao et al. U.S. Patent Application Publication 2004/0227460. Claim 39 depends from claim 1.

As discussed above, Tanaka, Mori, and Tsutsui do not disclose all elements of applicants' claim 1. Liao does not teach or suggest what is missing from Tanaka, Mori, and Tsutsui.

Thus, none of Tanaka, Mori, Tsutsui, and Liao discloses or suggests applicants' claimed invention. In addition, there is no disclosure or suggestion in any of Tanaka, Mori, Tsutsui, Liao, or anything else in this record that would have suggested the desirability of modifying or

combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

Accordingly, all claims are now fully in condition for allowance and a notice to that effect is respectfully requested. The PTO is hereby authorized to charge/credit any fee deficiencies or overpayments to Deposit Account No. 19-4293. If further amendments would place this application in even better condition for issue, the Examiner is invited to call applicant's undersigned attorney at the number listed below.

Respectfully submitted,

STEPTOE & JOHNSON LLP

Date: December 3, 2010

Houda MORAD

Roger W. Parkhurst
Reg. No. 25,177
Houda Morad
Registration No. 56,742

STEPTOE & JOHNSON LLP
1330 Connecticut Ave., N.W.
Washington, D.C. 20036
Tel: (202) 429-3000
Fax: (202) 429-3902